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KOOBOR NOTABILIS (DE VIS), AN UNUSUAL KOALA FROM THE PLIOCENE CHINCHILLA SAND

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ABSTRACT

Koobor notabilis from the late Pliocene Chinchilla Sand of southeastern Queensland is known from a maxillary fragment (F691) with P^4–M^3, and an additional, referred P^4 (F8976). It represents a unique group of koala-like animals known also from the early Pliocene Allingham Formation of northeastern Queensland.

De Vis (1889) describes *Pseudochirus notabilis* (as *Pseudochirus* ? *notabilis*) from a maxillary fragment (F691) with P^4–M^3. He records the type locality in Queensland as (p. 105) '. . . a gathering place enriched by agencies of unusal [sic] range and efficacy . . .'. Bartholomai (pers. comm. to Mahoney and Ride 1975) suggests from the preservation of the specimen that it probably comes from the Chinchilla Sand, considered by Bartholomai (1973) to be late Pliocene in age.

Archer in Archer and Wade (1976a) describes *Koobor jimbarratti* from the lower Pliocene Allingham Formation. Archer also refers *notabilis* to this genus, but notes differences between the Chinchilla Sand and Allingham species.

In the present work, a description of *K. notabilis* is given which supplements that of De Vis (1889) and an additional Chinchilla Sand specimen (F8976) is described.

Numbers prefixed by F are in the Queensland Museum fossil vertebrate collection. Numbers prefixed by UCMP are in the palaeontological collections of the University of California at Berkeley.

PHASCOLARCTIDAE OWEN
Koobor Archer

Koobor notabilis (De Vis, 1889)
(Fig. 1; Plate 14)

Pseudochirus ? *notabilis* De Vis, 1889, p. 113–4.

HOLOTYPE: F691, left maxillary fragment with P^4–M^3, and anterior parts of alveoli for M^4.

TYPE LOCALITY: Darling Downs, Queensland. Exact locality inadequately stated by De Vis, but Bartholomai (pers. comm. to Mahoney and Ride 1975) suggests the possible provenance as the Chinchilla Sand of late Pliocene age on the basis of preservation. Matrix on the specimen consists of clay and rounded sand grains, a lithology common at Chinchilla, but uncommon on the eastern Darling Downs.

DIAGNOSIS: Differs from only other known species, *K. jimbarratti* in that parastyle less well-developed; preprotocrista does not intersect base of paracone; buccal basins better-developed; crown appears less wrinkled; crenulations contacting anterior cingulum better-developed; conules better-developed; and there are accessory lingual cuspules on bases of hypocone or protocone.

DESCRIPTION OF HOLOTYPE: P^4 basically bicuspid, with posterior being slightly larger than anterior cusp. Both cusps conical joined at base. Two small crests radiate buccally from worn tip of posterior cusp and extend part way up its buccal flank. Buccal wall of anterior cusp damaged and no details preserved. Remnant of slight lingual crest extends lingually from worn tip of anterior cusp, up lingual face and contacts rudimentary lingual cingular swelling. Similar lingual crest may occur on posterior cusp but wear has obliterated any positive evidence. A short subhorizontal crest appears to extend anteriorly from tip of anterior cusp to broken anterior end of tooth. However, may also represent only broken edge of enamel. Large wear facets on tips of anterior and posterior cusps tilt towards one another and contact mesiolingually. Smaller wear facet developed on lingual cingular swelling. Mesial points of two sets of facets line up along an inclined transverse line, and represent an evidently large conical postero-buccaly positioned cusp on P_4 serially homologous

with hypoconid of M_{1-4}. Posterior face of P^4 bears very large thegosed facette evidently produced by large anterior crests of M_1 trigonid.

M^1 worn, protocone damaged. Tooth phascolarctid-like in buccal (relative to petaurids) position of paracone and metacone, and in postprotocrista and prehypocrista which do not bypass one another. Postparacrista and premetacrista subequal in length and extend buccally farther than subequal preparacrista and postmetacrista. Minor buccal longitudinal crests mark ends of paracone and metacone crests. These form interrupted ectoloph breached by fissures buccal to paracone and metacone. Longitudinal buccal crests, pre- and postparacrista define small paracone basin. Similar basin formed buccal to metacone but longitudinal buccal crests less well-developed and basin has larger buccal opening. Longitudinal buccal crest links otherwise widely separate buccal ends of postparacrista and premetacrista. Some suggestion of a posterolingual paracone crest and anterolingual metacone crest. Clear paracone rib present. Hypocone worn. Posthypocrista evidently connects to posterior cingulum. Prehypocrista passes anterobuccally to merge gradually with postprotocrista. Protocone damaged lingually but clear that preprotocrista extends anterobuccally and then turns sharply anteriorly to run abruptly into anterior cingulum. At point of inflection, also contacts (perhaps only with wear) protoconule. Small basin formed between protocone, anterolingual cingulum, and preprotocrista. Small rib runs anteriorly from protocone up into this basin. On anterolingual flank of hypocone small cusp occurs near common base with protocone. Some suggestion that small ridge extended towards this cusp from posterolingual base of damaged protocone. Protoconule well-developed anterolingual to paracone, consisting of curved crest linking anterobuccal cingulum with preprotocrista. Protoconule encloses small basin with anterior cingulum and preprotocrista, buccal to similar but anterolingual basin with which it shares preprotocrista as common wall. Two small ribs ascend anteriorly from protoconule to middle of protoconule basin. Anterior cingulum well-developed and intersected by preprotocrista, protoconule and preparacrista. Posterior cingulum well-developed buccal to point of intersection of posthypocrista, and swings posteroventrally to contact buccal end of postmetacrista. Whole surface of crown except perhaps central basin probably crenulated. Crenulations apparent in association with all major buccal crests, particularly towards cutting edges, protoconule, and anterior cingulum.

M^2 as in M^1 except as follows: Tooth worn but relatively undamaged. Pre- and postparacrista and premetacrista approximately subequal in length, but postmetacrista decidedly shorter. No apparent longitudinal buccal crests at buccal ends of postparacrista. Longitudinal buccal crest at end of preparacrista with very large posterior component. Premetacrista lacks anterior limb of longitudinal crest with result that no crests link buccal ends of

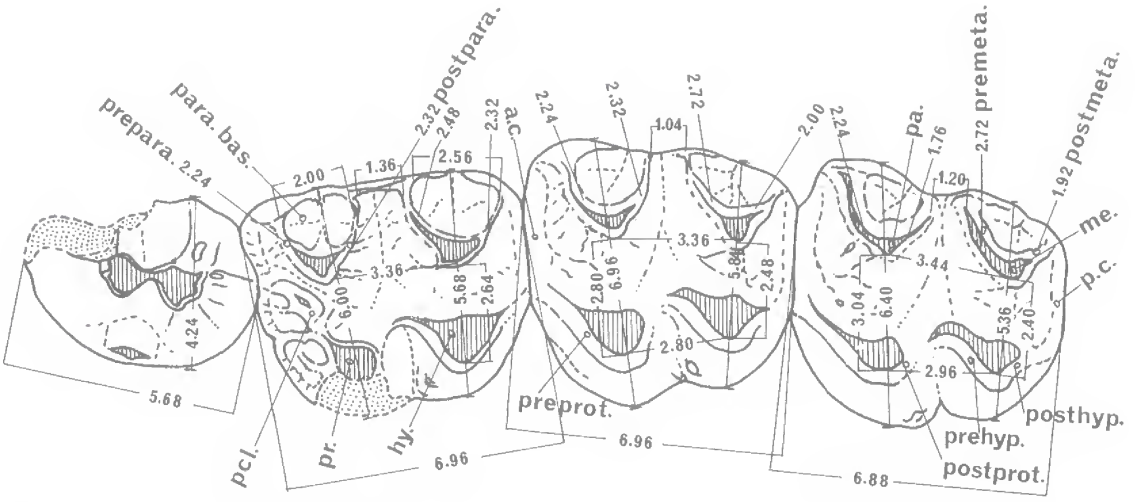

FIG. 1. Holotype *Koobor notabilis*, LP^4–M^3, showing measurements (in mm), how these were made, and terminology. Abbreviations: *a.c.*, anterior cingulum; *hy.*, hypocone; *me.*, metacone; *pa.*, paracone; *para. bas.*, buccal paracone basin; *p.c.*, posterior cingulum; *p.cl.*, protoconule; *posthyp.*, posthypocrista; *postmeta.*, postmetacrista; *postpara.*, postparacrista; *postproto.*, postprotocrista; *prehyp.*, prehypocrista; *premeta.*, premetacrista; *prepara*, preparacrista; *preprot.*, preprotocrista. Stippled areas damaged, lined areas worn.

premetacrista and postparacrista, leaving buccal opening to central basin. Opening of buccal paracone basin relatively more posterior in position than in M^1, and whole basin less well-enclosed buccally. Relatively short postmetacrista results in less symmetrical and less well-enclosed buccal metacone basin. Point of inflection in poorly-defined ectoloph present between buccal ends of postparacrista and premetacrista. Slight suggestion of posterolingual paracone rib but perhaps indistinguishable from vertical crenulations. Very slight to absent paracone rib. Prehypocrista appears to terminate on posterobuccal flank of protocone. Postprotocrista appears less well-developed than in M_1 and may have even been absent. Preprotocrista extends anterobuccally directly to anterior cingulum without point of inflection. No basin formed between it and anterior cingulum. Protoconule worn but evidently small, and base connected to buccal side of preprotocrista as well as base of paracone. Anterior end did not reach anterior edge of tooth. Anterior and posterior cingula simple and comparable in morphology to posterior cingulum of M^1. Crenulations less apparent over whole surface of tooth (perhaps due to wear) except on anterior flank of preparacrista, anterior cingulum, and protoconule.

M^3 as in M^2 except as follows: Preparacrista and premetacrista subequal in length, and longer than postparacrista which is longer than postmetacrista. Small anterior limb present on longitudinal crest at buccal end of postparacrista. Short postparacrista results in less symmetrical buccal paracone basin. Point of inflection in buccal outline of tooth broader than in M^2 and also encompasses buccal end of postparacrista. Small prominent cusp on posterolingual flank of protocone but none on anterolingual flank of hypocone.

M^4 suggested only by alveoli. These represent anterobuccal and lingual roots and indicate tooth was wider anteriorly than posterior half of M^3.

Meristic gradients along tooth row from M^1 to M^3 as follows: Preparacrista becomes longer and extends further in buccal direction. Postparacrista M^1 shorter than that of M^2 which is longer than that of M^3. Postparacrista extends less in buccal direction. Premetacrista M^1 shorter than that of M^2 which is longer than that of M^3. Premetacrista extends less in buccal direction. Postmetacrista steadily decreases in length. Buccal paracone and metacone basins become less well-developed. Distance between buccal ends of postparacrista and premetacrista decrease M^1 to M^2 but increase M^2 to M^3. Longitudinal buccal crests on postparacrista and postmetacrista decrease in development but on preparacrista and premetacrista increase in development. Postprotocrista decreases in apparent significance. Protoconule decreases in size. Anterior cingulum becomes markedly more simple between M^1 and M^2 (M^3 as in M^2). Tooth width increases from M^1 to M^2 but decreases from M^2 to M^3. Relative width of posterior part of tooth (line through hypocone and metacone) steadily decreases.

Referred Specimen: F8976, collected in 1973 by screenwashing surface scree of a small knowl (Queensland Museum Locality no. L294) of the Main Gulley System, on the Chinchilla Rifle Range (Rifle Range No. 78, Parish of Chinchilla). The surface scree is an erosional remnant of the conglomerate forming the crest of the knowl at this point. The tooth appears to be an unworn right P^4 of *Koobor notabilis*. Although it is narrower than P^4 of the holotype, some variation might be expected in tooth width. It is basically similar in morphology to P^4 of the holotype.

Two median longitudinal crest units are present which, with wear, would appear as two cusps. Anterior crest unit has inclined anterior crest intersected near anterior end by small vertical crest. Posteriorly, near apex, anterior longitudinal crest crossed transversely by small crest which ascends buccal and lingual face. Longitudinal crest continues posteriorly, ending abruptly opposite posterior crest unit. On buccal base of anterior longitudinal crest, small but prominent cusp occurs. Posterior crest unit with longitudinal crest which passes posteriorly from apex to posterior end of tooth, then swings gracefully in lingual direction. Anteriorly from apex, short longitudinal crest extends towards anterior crest unit, intersected near anterior end by well-developed crenulated vertical buccal crest. Anterior tip of anterior longitudinal crest just passes buccal to posterior tip of anterior crest unit. Buccal flank of posterior crest unit with vertical crenulations. Steep-sided median transverse valley marks boundary between anterior and posterior crest units. Lingual base of crown mildly crenulated and could provide surface for wear facet in homologous position on P^4 of holotype.

Reference of this undoubted Chinchilla Sand specimen to *Koobor notabilis* adds credance to the suggestion of Bartholomai (noted above) that the holotype is also from the Chinchilla Sand.

DISCUSSION

It seems strange that De Vis's proclivity for naming new genera should have abandoned him at one of the few times such action was warranted. Whatever the reasons for De Vis's hesitancy, there

can be no doubt that *Koobor* is generically distinct from other known phalangeroids.

Koobor is diagnosed from all other phascolarctids by Archer in Archer and Wade (1976). The additional characters of F691 and F8976 permit further points of difference to be noted. *Koobor* differs from *Phascolarctos* most significantly in its markedly dissimilar P^4 morphology; longer and narrower molars; and construction of the buccal paracone and metacone basins. *Koobor* differs from *Litokoala* (known only from M^1) in the significantly different construction of the buccal paracone and metacone basins, and the different buccal shape of the crown. *Koobor* similarly differs from *Perikoala* (paratype UCMP45343, Tedford and Woodburne 1967) in at least the construction of the buccal paracone and metacone basins.

Recognition of *Koobor* as a phascolarctid indicates the diversity and hence probable antiquity of the family. The P^4 morphology of *Koobor* is one of the most distinctive characters of the genus. Combined with the unusual molar morphology, it suggests that the stock to which *Koobor* belongs diverged from that to which *Phascolarctos* belongs possibly as early as mid-Tertiary times. *Koobor notabilis* probably represents a late Tertiary survivor of a previously more diverse group.

P^4 of *Phascolarctos* has a longitudinal crest which appears to be the homologue of both cusps on P^4 of *Koobor*. In *Phascolarctos*, this crest shows a mild inflection and is buccally convex. Wear facets on this crest in *Phascolarctos* are in homologous positions with wear facets on the two cusps of P^4 in *Koobor*. The anterior facet in *Phascolarctos* is produced by occlusion with a part of the longitudinal crest of P_4. The posterior facet is produced by occlusion with the posterobuccal cusp or crest of P_4. In *Koobor*, the steep angles of the wear facets and their proximity to one another suggests P_4 has a large posterobuccal cusp. It is also possible that a second tall cusp or longitudinal crest occurred which closely approximated the posterobuccal cusp.

K. jimbarratti from the early Pliocene Allingham local fauna is known from only one tooth. It appears to represent essentially the same kind of animal as *K. notabilis*, but differs in enough minor details to warrant specific separation. It has been interpreted (Archer in Archer and Wade 1976) as being older and possibly structurally ancestral to *K. notabilis*.

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